Meeting Summary
17-mile RI/FS Modeling Meeting
June 28, 2016
10:00 AM to 2:30 PM

Participants

Region 2 (R2)	CPG
Jennifer LaPoma	Rob Law (de maximis)
Eugenia Naranjo	John Connolly (AQEA)
Michael Sivak	Peter Israelsson (AQEA)
Ed Garland (HDR)	Pete Oates (AQEA)
James Wands (HDR)	Wen Ku (AQEA)
Scott Kirchner (CDM)	Mathew Rooni (M&N)
Aaron Frantz (CDM)	John Toll (WW)

Jonathan Clough (Warren-Pinnacle) – by phone

Introductions/Opening Remarks: There were no opening remarks; group proceeded directly to the modeling topics on the agenda.

- **COPCs for which the Chemical Fate & Transport (CFT) model will be calibrated (EPA Comment 372)**
    - CPG communicated its strong desire to reduce the number of Chemical of Potential Concerns (COPCs) to a more tractable number than the 29 Dioxin/Furan congeners required by R2, based on several considerations:
        - The level of effort.
        - COPCs not driving risk are not needed for remedial decision-making.
        - Some COPCs are poor candidates for calibration because of (a) many non-detect samples in the water column dataset, and/or (b) strong influences from poorly quantified regional background sources.
        - R2's objective to cover a wider range of partitioning behaviors can be achieved by a small subset of R2's COPC list.
    - R2 explained that CPG can calibrate a small set of COPCs and test the others as a validation exercise, per R2's approach in the FFS/ROD model.
    - R2 expressed concern that not simulating all 29 COPCs may limit future risk assessment for the LPR RI/FS and also for the NBSA RI/FS.
        - CPG asked for R2 to identify a risk threshold to use in reducing the modeled COPCs list and for R2 to clarify which additional COPCs would be required for NBSA needs.
    - R2 agreed that a Theissen polygon based mapping could be used for COPCs not needed for remedial benefit evaluation, so as to reduce the level of effort.
    - **Proposed Action:**
        - CPG will provide R2 a table containing chemical properties, estimated risk, availability of a) high volume chemical water column (hv-CWCM data) (for partitioning settings), b) literature values of partitioning parameters and and c) small volume (sv)-CWCM data (for calibration) for the 48 COPCs in the EPA

FFS/ROD model. CPG will highlight COPCs it proposes for calibration and specify the type of mapping to perform (conditional simulation vs Theissen polygons), along with reasons for excluding COPCs.
- R2 will provide a risk threshold to CPG to guide the COPC selection in LPR and NB.

- **CFT model partitioning to various carbon phases (EPA Revisions 3b, 4d)**

  a. Proposed approach to approximate desorption kinetics

  - CPG overviewed desorption kinetics and their importance in CFT modeling.
  - CPG proposed a partitioning framework that accounts for desorption kinetics in a simplified manner.
  - R2 acknowledged the influence of desorption kinetics and had no initial objections to the proposed framework, pending further review of the notes provided by CPG on the day before the meeting.
  - CPG showed preliminary 2378-TCDD and Tetra-CB settings for the new framework that it derived from the hv-CWCM data. R2 questioned the results and the CPG agreed to work with R2 to establish values.
  - R2 made the point that the algal representation should be spatially varying and improved with monitoring data from the NJ Dischargers Group.
  - **Proposed Action:**
    - R2 will contact the PVSC about obtaining the NJ Harbor Discharger's weekly water quality monitoring data to support algal carbon evaluation.
    - CPG will further analyze the algal carbon to total POC ratio using available data.
    - CPG will provide further details on the derivation of Equation 16 in the partitioning notes provided to R2.

- **CFT model simulation of a fluff layer**

  a. Consistency between Sediment Transport (ST) and CFT models (EPA Revision 3d)

  - R2 expressed concerns about differences between the ST and CFT fluff layer representation.
  - CPG explained the fluff layer algorithms in the ST and CFT models, and clarified that they are designed to represent different phenomena. The CPG will improve its descriptions of the algorithms to avoid confusion over terminology.
    - CPG showed diagnostics to illustrate the behavior of the CFT model's fluff layer and its goal of capturing recently deposited solids "going up and down" over a tidal cycle, which is not generally equivalent to the material in the ST model's fluff layer.
    - R2 requested additional diagnostics which compare the CFT and ST model's fluff layers for specific cells to facilitate R2's review of the topic. These diagnostics should include periods when the fluff layer conditions are independent of the assigned initial condition.
    - CPG explained that a "thickness transfer" is introduced to avoid buildup of

stagnant fluff sediment that can equilibrate with underlying sediments.
- R2 suggested considering an alternative approach to move "excess" thickness to the underlying layer for each coupling interval.
- There was additional discussion on the dynamics of the fluff layer and the extent to which it reflects the water column vs. the bed.

b. Parameterization of transfer with parent bed (EPA Revisions 3c, 3e)

- CPG stated that the length scale used in the fluff mixing equation will be changed as R2 suggested, and that this will likely have a minimum impact to the results.
- CPG explained the mixing between the fluff and the underlying layer and agreed to modify the equation to accommodate different composition between the fluff and the underlying layer.

- R2 and CPG disagreed whether the mixing rate between the fluff and the underlying layer should be restricted to values equal to or greater than the mixing rate between the underlying bed layers 1 and 2. This topic will be further discussed during the bioaccumulation model meeting on June 29th.
  - R2 believes similar bioturbation should occur between the fluff layer and the underlying layer.
  - CPG believes the exact mixing process between the fluff layer and the underlying layer is unknown, and will let the calibrated value of the mixing rate guide the interpretation.
- **Proposed Action:**
  - CPG will generate detailed diagnostic figures to illustrate the fluff layer behavior on comparisons between computed and measured water column contaminant concentrations (CWCM data) at intra-tidal time scales.
    CPG will update the composition in the CFT fluff layer to be consistent with the ST model, and revise the mass transfer formulation accordingly.

- **Bulk density impact on computed CFT model concentrations (EPA Revision 3f)**

  - R2 presented diagnostic charts indicating that the bulk density assigned to a subsurface layer can change and produce unrealistic changes in dry-weight contaminant concentrations. R2 indicated the FFS/ROD model's use of a fully consolidated bulk density for cohesive solids avoids this artifact.
  - CPG stated its interpretation that the artifact is a consequence of the OC model framework and its averaging of ST model computed bulk density into an active layer and an archive layer. The bulk density of an individual layer changes due to changing composition in the active layer, and also when a layer crosses the active and archive layer interface (as demonstrated by the figures presented by R2).
  - CPG suggested that the artifact noted by R2 would also occur in the FFS/ROD model.
  - R2 suggested that a potential solution may be to change layer volumes as density changes
  - It was decided to further evaluate the importance of this issue by looking into the time trends in15-cm average concentrations, and to compare the performance of R2's approach to CPG's approach to representing consolidation.

- **Proposed Action:**
  - CPG will provide additional diagnostics to evaluate the top 15-cm average concentrations.
  - CPG will repeat R2's diagnostic using R2's fully consolidated approach in the OC and CFT models to further evaluate this issue.
  - CPG will also assess the extent to which the noted bulk density changes are the result of shifting composition.

- **Rate of recovery in depositional areas (possibility of added carbon to sands)**
  - CPG stated its intent to re-assess recovery in depositional areas after implementing all other changes to the ST/OC/CFT models. If adding carbon to sands is deemed necessary, then options for doing so will be revisited with R2.
  - R2 asked CPG to examine the consistency of the predictions of accumulation of non-cohesive solids in some areas predicted to have high COPC concentrations by CPG's contaminant mapping. R2 walked through a figure from their comments showing a large shift of bed composition from the beginning to the end of a 15-year simulation. CPG responded that this is partially due to the approach of specifying the initial composition in the ST model.
    - **Proposed Action:** CPG will review
      - Areas with significant sand accumulation in the ST model.
      - Whether the behavior is influenced by the CFT model re-initialized for projections
      - The predicted bed composition at the end of WY2010 and its compatibility with the CPG's COPC mapping, once the revised approach is approved by R2.

- **ST model grain stress partitioning (EPA Revision 1b)**
  - R2 informed the CPG of a minor error in the ST model initial conditions causing some grid cells along the shoals to be initialized with a D50 of zero. R2 also indicated the skin friction could vary widely if D50 were allowed to change over time in the ST model. R2 provided figures in support of each of these findings.
  - CPG responded that the error noted by R2 affected ~8% area and will have a small impact to the results, and so does not require re-calibration. CPG proposed no change to the current approach of keeping the constant D50 over time for computing skin friction. CPG presented several graphics to demonstrate that the current CPG ST model results are highly similar to the FFS/ROD model predictions which do include time-variable D50. Given issues encountered when running the CPG ST model with variable D50, and given the similarity in overall performance between the RI/FS and FFS/ROD models, the CPG's position is that there is little value to be gained in pursuing that option and therefore proposes not to change the current approach.
  - R2 will further consider CPG's proposal to not use variable D50 in partitioning grain stress.
  - **Proposed Action:** CPG will correct the D50 values by correcting the model initialization

that caused the error.

- **ST model decoupled mode – issue of changing bathymetry (EPA Revision 1a)**
    - CPG proposed no change to the current approach of decoupling the HD and ST model despite the 2-month lag that may occur between bathymetric updates, arguing that the current approach is sufficient because the change in shear stress is insignificant given the bathymetric change differences caused by the decoupling. CPG demonstrated the consistency of shear stresses between model predictions in decoupled model and manual calculations of more frequent bathymetry updating.
    - R2 indicated the decoupling between the HD and ST model may be acceptable for simulating baseline conditions, but will need to reflect more frequent bathymetric change in the ST model when simulating dredging without backfill to grade.
        - CPG responded that the model bathymetry is currently set to update at the end of each projection year, but that the updating frequency can be modified.
        - CPG also indicated that including real-time bathymetric change will increase model run time significantly, particularly given that the CPG estimated dredge rate is much slower than R2's.
    - R2 will consider CPG's proposal of no change for the RI baseline simulation.
    - **Proposed Action:** CPG will update bathymetric change more frequently in the ST model to simulate dredging without backfill to grade (e.g., navigational dredging downstream of RM 1.7).

- **Organic Carbon (OC) model**
    - **a. Comparison to data (EPA Revision 2a)**
        - CPG agreed with R2's position that model-data comparisons for the OC model should be evaluated over the long-term period used for the ST/CFT model calibration.
    - **b. Mass balance (EPA Revision 2b)**
        - CPG agreed to evaluate the mass balance approach moving forward and to adopt it provided that it is able to reproduce data and not cause issues for the CFT model simulations.
        - CPG stressed the importance of reproducing observed bed carbon concentrations so that reasonable carbon-normalized values can be provided to the bioaccumulation model. R2 did not disagree but asked CPG to report on findings if issues with the mass balance approach force the existing fixed fraction organic carbon (f_{oc}) approach to be used as an alternative.
        - **Proposed Action:**
            - CPG will conduct long-term model data comparisons for the OC model.
            - CPG will revert to the mass balance approach agreed to with R2 as part of the OC simplification agreement. However, CPG will switch back to the constant f_{oc} approach if the mass balance approach does not provide reasonable carbon estimates, and document the findings for R2, including

quantification of the carbon mass imbalance introduced by the constant f_{oc} approach.

- **Representation of Feasibility Study (FS) alternatives in models (Revisions 1c, 2c, 3g)**
  - R2 stressed the need to include solids/carbon/contaminant release, associated with dredging, bathymetric changes and changes in bed composition due to capping for the projection simulations, as R2 observed significant differences in their results when incorporating these changes to their simulations.
  - CPG indicated the model is capable of representing these processes and they can be added to future FS simulations. However, CPG expressed concern that implementing real-time bathymetry adjustment will drastically increase the run time and that less frequent updating can be used.
  - CPG also proposed to address a potential bias imparted by an "upscaling" issue in future simulations of remedial capping. Because the erosion velocity is computed by the solids flux normalized by the average cohesive solids concentration over the top 15 cm interval, the erosion velocity may be overestimated in capped areas, potentially resulting in an underestimation of post-remedial contaminant concentrations. R2 will give some thought to this issue.
  - CPG inquired about the status of R2's review of CPG's proposed approach to characterize remedial benefit, which was presented during the April 27 COPC mapping meeting. R2 responded that it is under review.
  - **Proposed Action:**
    - CPG will implement dredge release for solids, carbon, and contaminants, more frequent adjustments of bathymetry and include bed composition for caps in the projection simulation.
    - CPG will attempt to address the upscaling concern by using a composition more representative of the near-surface sediments when computing the erosion velocity for the OC and CFT models

- **Additional Discussion**
  - **Comment 552:** R2 expressed its position that when an area is characterized as being hard bottom or shallow sediment in the contaminant mapping, it should also be represented as such in the ST model. CPG agreed conceptually and will review this issue further, and potentially adjust the ST model accordingly.
  - **Comment 556:** R2 mentioned the noted discontinuity in the vertical contaminant concentration profiles in the CFT initial conditions for a number of grid cells. CPG provided an initial thought that this discontinuity may be due to a limitation of the algorithm, and indicated that the issue will be revisited once a new surface mapping approach is approved by R2.